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Comparative Readability of Text Printed in All Upper Case Letters and Text Printed in Upper and Lower Case Letters

1. Recently, a number of Agency officials have directed inquiries to PSS concerning the relative readability of text printed in all upper case letters, such as that typically obtained in printed computer output and output from communications devices. This interest has been based, at least in part, on whether the possible increase in readability gained by converting from all upper case text output to mixed case output would justify the cost required to make this conversion. In response to these inquiries, PSS has conducted a review of relevant human factors literature, and the principal purpose of this memorandum is to report some of our findings and conclusions.

2. In an early study, Tinker and Paterson (Journal of Applied Psychology, 1928, 12, 359-368) found material printed in upper and lower case letters to be read 13% faster than text printed in all capital letters.

3. Fox (Ergonomics, 1963, 6, 193-198) reported that Standard Elite typeface, which consists of upper and lower case letters, is read significantly faster than Gothic Elite typeface, which consists entirely of small upper case letters.

4. Poulton and Brown (Journal of Applied Psychology, 1969, 52, 16-21) found that teleprinter output is read 13% faster and comprehended better when printed in upper/lower case letters than when printed entirely in capital letters.

5. In his comprehensive book entitled Legibility of Print (Ames Iowa: Iowa State University Press, 1963), Miles A. Tinker concluded as follows:

"All-capital print greatly retards speed of reading in comparison with lower-case type. Also, most readers judge all capitals to be less legible. Faster reading of the lower-case print is due to the characteristic word forms furnished by this type. This permits reading by word units, while

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all capitals tend to be read letter by letter. Furthermore, since all-capital printing takes at least one-third more space than lower case, more fixation pauses are required for reading the same amount of material. The use of all capitals should be dispensed with in every printing situation." (page 65)

6. These findings clearly show that human performance improvements can be achieved in work tasks involving the reading and comprehension of printed text by converting from printface in all upper case letters to printface in mixed upper and lower case letters. PSS is prepared to consult further with Agency components interested in this problem and is also prepared to assist in determining the precise tradeoffs between the potential human performance improvements and the costs required to make such a conversion.


Psychologist, PSS/OMS

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D/MS note to A-DL .&S:

"Bob:

"Ken advises there were no studies
to the contrary.

John"